1248
186/G11/8
186

UGC Sponsored Seminar

on

PERSPECTIVES OF QUALITY EDUCATION

Library

Organised by :

INSTITUTE OF EDUCATION FOR WOMEN
Hastings House, Alipore
Kolkata - 700 027

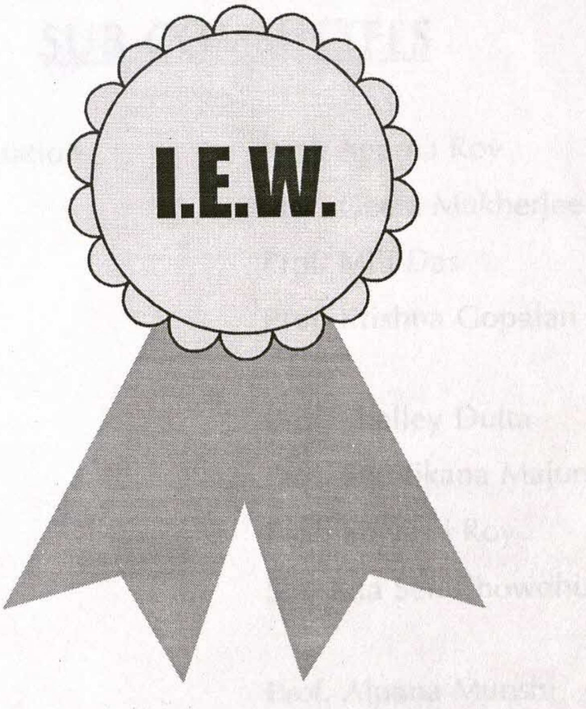
23rd March, 2005

Dr. Rathindranath De
Director, SCERT, West Bengal.
Kolkata.

148

186/Gift

UGC Sponsored Seminar
on
PERSPECTIVES OF QUALITY EDUCATION



Library
Calcutta
35/3, B. C. Road

Organised by :

INSTITUTE OF EDUCATION FOR WOMEN
Hastings House, Alipore
Kolkata - 700 027

23rd March, 2005

SEMINAR COMMITTEE

Chairperson : Prof. Nina Nandy
Officer-in-Charge

Jt.-Convenor : Prof. Sujata Raha
Prof. Aparna Banerjee

SUB-COMMITTEES

Reception and Registration : Prof. Aparna Roy
Prof. Geeta Mukherjee
Prof. Mili Das
Prof. Krishna Gopalan

Refreshment : Prof. Shelley Dutta
Prof. Smritikana Majumder
Prof. Rajyasri Roy
Sm. Rita Sen Chowdhury

Publicity : Prof. Alpana Munshi
Prof. Aparna Chakraborty

Publication : Prof. Sujata Raha

PROGRAMME

11.00 a.m. : Registration

12 noon : Inaugural Programme

12.30 p.m. : Welcome Address
by Prof. Nina Nandy
Officer-in-Charge

12.40 p.m. : Lunch Break

01.00 p.m. : Keynote Address
by Prof. Sujata Raha

01.15 p.m. : Presentation on
Policy and Perspectives
An overall view on Quality Education by
Prof. Subimal Sen, Vice Chairman, West
Bengal State Council of Higher Education.

02.15 p.m. : Principles of Education Technology
for Quality Education by Prof. Rita Sinha,
Dept. of Education, Calcutta University.

03.15 p.m. : Application of Education Technology
for Quality Education by Prof. Asit Dutta,
Dept. of Applied Physics, Calcutta University

04.15 p.m. : Vote of thanks by
Prof. Geeta Mukherjee

INTRODUCTION

Institute of Education for Women, Hastings House, the College of Teacher Education has established itself as a premier institution in the field of Teacher Education. The institution has glorified itself for the last fifty one years and looks forward for a much glorified status. The outcomes of this esteemed institution are well-trained, well-conversant and enthusiastic quality teachers for secondary schools.

Standing at the threshold of knowledge explosion in this millenium, an era of technological based education, the question that arise is – How to educate a child of today? Should he be burdened only with knowledge and technological competency, leaving no rooms for his creative mind? or, Should we think of an alternative to this? For quality of life, what should be the parameters of quality education? To analyse these thoughts, a UGC sponsored seminar on "Perspectives of Quality Education" was organised at our Institution on 23rd March, 2005.

Amongst the eminent speakers we had Prof. Subimal Sen, Vice-Chairman, West Bengal State Council of Higher Education; Prof. Rita Sinha, Dept. of Education, Calcutta University and Prof. Asit Dutta, Dept. of Applied Physics, Calcutta University. We owe our heartiest gratitude to them for making the Seminar successful.

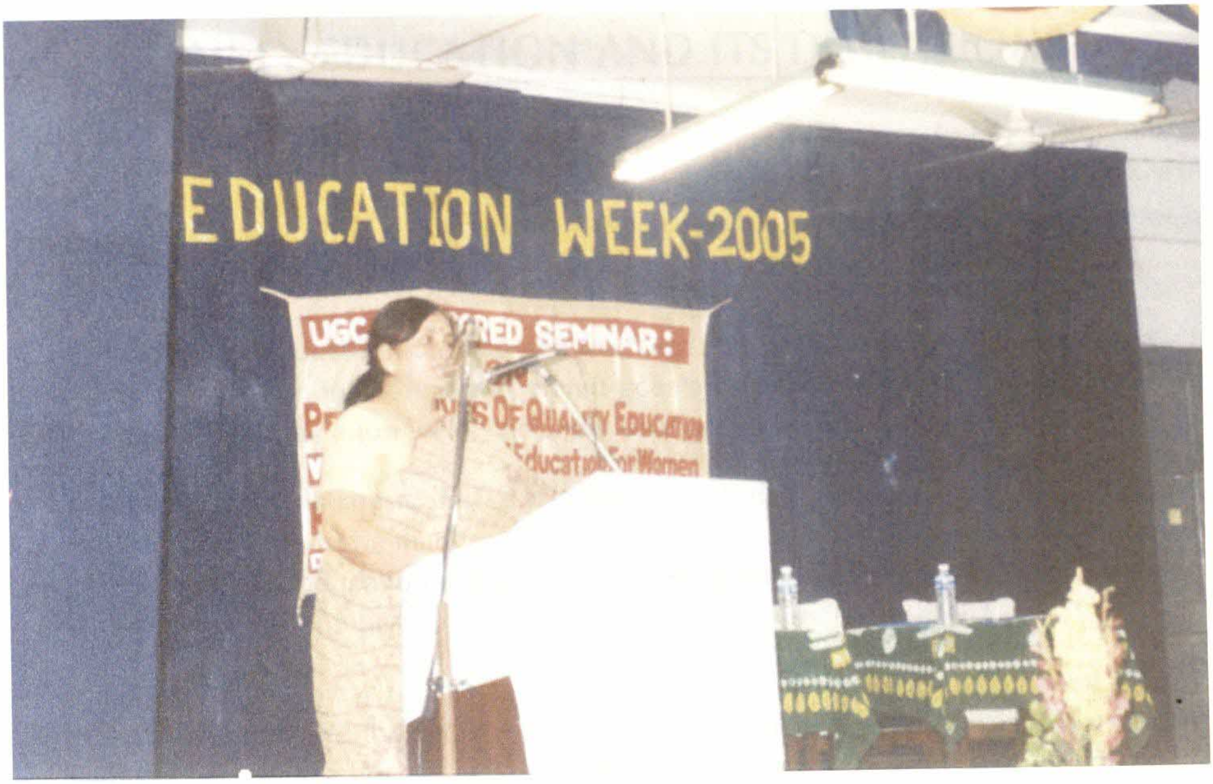
We are also grateful to Dr. Ratnabali Banerjee, Deputy Secretary, ERO, UGC, Calcutta for inspiring us to organise this Educational Seminar.

Nina Nandy
Officer-in-charge

…TION WEEK-2005
UGC SPONSORED SEMINAR:
ON
PERSPECTIVES OF QUALITY EDUCATION
VENUE: Institute Of Education For Women
HASTINGS HOUSE(ALIPORE)KOLKATA-27
DATE: 23rd. MARCH, 2005

UGC Sponsored Seminar
From Left : Prof. Nina Nandy, Prof. Rita Sinha, Prof. Asit K. Datta, Prof. Subimal Sen

Presentation by Prof. Subimal Sen
Vice Chairman, West Bengal State Council of Higher Education



Presentation by Prof. Rita Sinha
Reader, Dept. of Education, Calcutta University

Participants at the Seminar :
Professors and Students

QUALITY EDUCATION AND ITS DIMENSIONS

– Key Note Address
DR. SUJATA RAHA
Reader, Institute of Education for Women, Hastings House

The concept of education has changed from age to age. Education is never ending – it starts with the birth of an individual and then it goes on till the last day of his life. It is a life long process. In fact, education makes an individual a real human being.

Modern education is considered as a process of self-development. According to Swami Vivekananda, "Education is the manifestation of the perfection already in man". Rabindranath Tagore considered it as 'education of heart'. Mahatma Gandhi said, "By education, I mean an allround drawing out of the best in child and man – body mind and spirit."

From these views we can understand that education is a purposeful and planned activity. It makes a man quite fit for the society. So the main purpose of education is 'man-making' and the ultimate aim of education is not the development of the individuality but the enrichment of personality. Education must transform a man from individual being to social being. Education helps in bringing about allround development in the personality of the child which implies physical, moral, social, cultural and academic development. So that the individual will be fit as a socialised individual. In fact, this social aim of education is very important for modern eduction.

In 1996, the UNESCO document – **'Learning : the treasure within'**, Commonly known as Delors Commission Report has described four pillars of education as :

(i) Learning to know (ii) Learning to be (iii) Learning to live with others (iv) Learning to do, to be inculcated through the process of education. Here also the main essence is 'man-making' education.

"Education for All" (EFA) introduced by the World Education Forum held at Dakar in the year, 2000. It is known as 'Dakar Frame Work of Action'. The forum declared six commitments in the form of goals. Out of six, three are concerned with about basic and primary education of good quality. These three commitments are :

1) · "Ensuring that by 2015 all children, particularly girls, Children in difficult circumstances and those belonging to ethnic minorities, have access to and complete, free and compulsory primary education of good quality."

2) · "Eliminating gender disparities in primary and secondary education by 2005 and achieving gender equality in education by 2015, with a focus on ensuring girls' full and equal access to and achievement in basic education of good quality."

3) · "Improving all aspects of the quality of education and ensuring excellence of all so that recongnised and measurable learning outcomes and achieved by all, especially in literacy, numeracy and essential life skills."

It has been indicated in the EFA documents that "where right to education is guaranteed, people's access to and enjoyment of other rights is enhanced." It also emphasised the term 'education of good quality'.

In our country Sarba Siksha Abhiyan (SSA) is being implemented, with a target of providing eight yerars of quality education to all children in the age group of 6-14 years by the year 2010.

Now the question is what is **'Quality Education'**? Today different conferences are being held regarding 'Quality Education'.

World Round Table Conference on Quality Education held at UNESCO head quarters on October 2003, take note of the enormons disparities in the unequal world that 'make a possibility of equal opportunity to participate in a quality education a dream that is currently unattainable for many'. According to the report of this meeting : "Quality Education is a public service and a social good that shapes the identities of individuals and raises the aspirations of the society."

In July, 2004 The round Table Conference on "Quality School Education : Achievement and Sustainability" held at Hyderabad. The report of the conference has described "Quality education is fundamental in creating a future for human security, community development and national progress". That is to say, the Quality education is a fundamental factor for community development, human security and national progress also.

According to National Curriculum Frame Work, 2005 by NCERT "Quality is a systematic attribute rather than only a feature of instruction or attainment...... quality expresses the system's capacity to reform itself for enhancing its ability to remedy its own weakness and to develop new capability."

Infact, Quality education stands for achieving proper knowledge, skills and values. The important factors of quality education are as under :

(i) Learning environment

(ii) Curriculum

(iii) Text books and Teaching learning materials

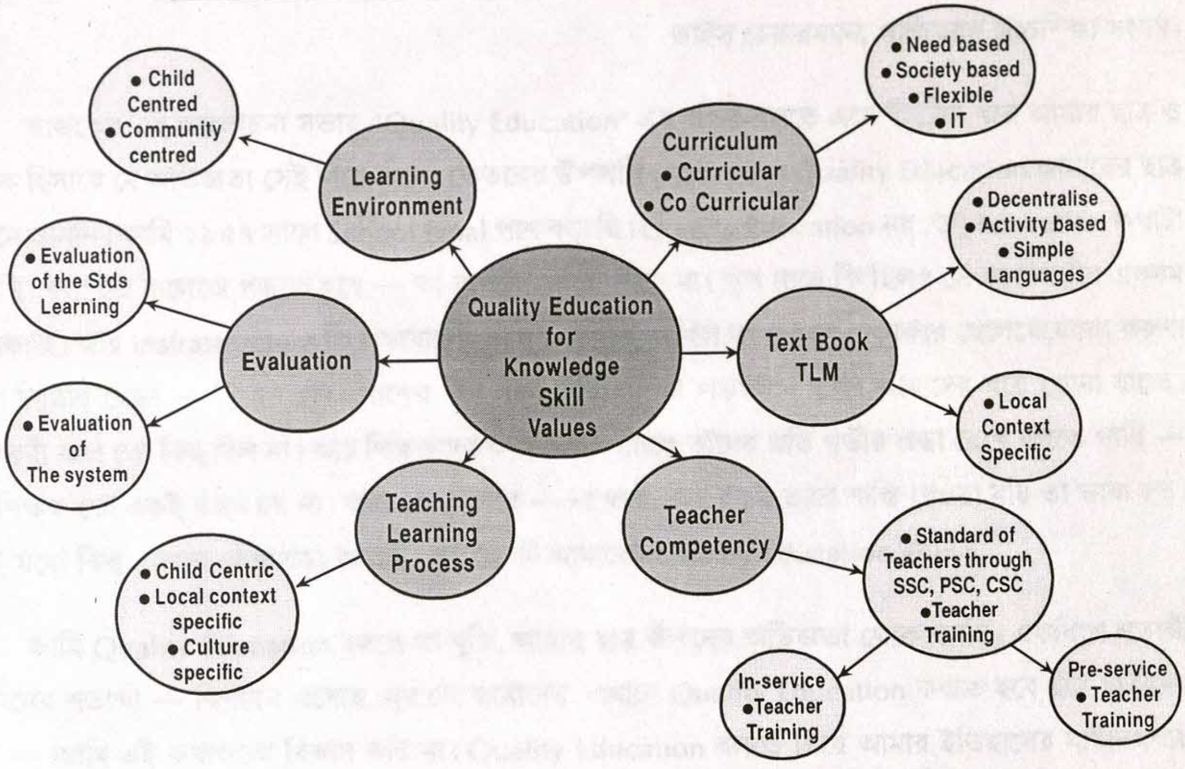
(iv) Competent Teachers

(v) Teaching Learning Process

(vi) Evaluation.

A diagram related to the factors of 'Quality Education' is produced here.

Factors Influencing Quality Education



- The crucial component of the quality improvement process seems to be the quality of teachers. If children have to experience the joy of learning, teachers have to experience the joy of teaching. For the improvement of the quality of teachers, emphasis should be given on teachers training. Two types of teachers training programmes are required – Preservice Teachers Training Prog. & Inservice Teachers Training Programme.

- Text books should be child centred, activity based, decentralised and in simple language.

- Teaching learning material (TLM) should be local context specific, special remedial materials should be provided for special groups.

- The learning environment should be natural as well as joyful. The child should be the centre of education. His / her level of comprehension is very important for quality.

- Proper weightage should be given to curricular and co-curricular activities in the school time table and at final evaluation.

- Information Technology (IT) should be integrated into the curriculum.

The factors noted above determine the ability of the sub-systems in the system of education and therefore also determines the quality of education. A decentralised planning to enhance the capability of the sub-systems will lead to participation by the teachers, parents, community and all other stakeholders and therefore will lead to better quality of education.

আধুনিক সমাজের প্রেক্ষাপটে গুণগত মানের শিক্ষা

— অধ্যাপক সুবিমল সেন

ভাইস চেয়ারম্যান, পশ্চিমবঙ্গ উচ্চশিক্ষা সংসদ।

আজকের এই আলোচনা সভায় "Quality Education" এর ওপর বলতে এসে দীর্ঘদিন ধরে আমার ছাত্র ও শিক্ষক হিসাবে যে অভিজ্ঞতা সেই নিয়ে বলব। ভেতরের উপলব্ধি থেকে বলব। Quality Education আমাদের ছাত্র জীবনে শুনিনি। আমি ১৯৫৭ সালে School Final পাশ করেছি। Quality Education নয়, শুধু Education কথাটা শুনেছি। বলা হত কলেজে পড়তে হবে — তা না হলে খেতে পাবে না। স্কুল মানে কি ছিল? সে হবে বাড়ীর একদম কাছাকাছি। আর Insfrastructure কি? আমাদের স্কুলের যে চেহারা ছিল তা দেখলে এখনকার ছেলেমেয়েদের করুণা হবে। দরমার বেড়া — টিনের ছাদ। পাশের ঘরে যখন মাষ্টারমশায় পড়াচ্ছেন তখন আমাদের ঘরে শোনা যাচ্ছে। লাইব্রেরী বলে তো কিছু ছিল না। আর শিক্ষকদের কথা বলতে গেলে তাঁদের প্রতি গভীর শ্রদ্ধা রেখে বলতে পারি — সব শিক্ষক তো একই রকম হয় না। অন্য কোন ভাবে — না থাক, কত রকম ভাবে শাস্তি দেওয়া যায় তা ভাবা হত। এরই মধ্যে কিন্তু আমরা লেখাপড়া করেছি। তাহলে কী আমাদের Quality Education হয়নি?

আমি Quality Education বলতে যা বুঝি, আমার ছাত্র জীবনের অভিজ্ঞতা থেকে বলছি। একবিংশ শতাব্দী বিজ্ঞানের শতাব্দী — বিশ্বায়ন এসেছে, সুতরাং আমাদের এখানে Quality Education করতে হবে ছাত্র ছাত্রীদের জন্য — আমি এই কথাগুলো বিশ্বাস করি না। Quality Education বলতে গিয়ে আমার ইতিহাসের মাষ্টারমশায় জ্যোতিপ্রসাদ বন্দ্যোপাধ্যায়ের কথা মনে হয়। জ্যোতিপ্রসাদ বন্দ্যোপাধ্যায় পরবর্ত্তীকালে Calcutta University Education Department-এর প্রধান হয়েছিলেন। তখন মাষ্টারমশায়রা ৬০ টাকা মাইনে পেতেন। জ্যোতিপ্রসাদ বন্দ্যোপাধ্যায় ছিলেন একটু বেশী মাইনের মাষ্টারমশায়। তিনি ৬৫ টাকা পেতেন ১৯৫৭ সালে। কিন্তু তাঁর শিক্ষার পদ্ধতি ইতিহাসের প্রতি আমার আগ্রহ জাগিয়েছিলেন। আমি বিজ্ঞানের ছাত্র — দশম শ্রেণীর পর ইতিহাস পড়ার সুযোগ হয়নি। কিন্তু পরবর্তীকালেও ইতিহাস পড়ার আগ্রহ থেকে গেছে। বহু ঐতিহাসিক ঘটনার ওপর প্রশ্ন জেগেছে মনে — তার উত্তর খুঁজে বেড়িয়েছি। এই যে বিষয়ের প্রতি আগ্রহ জাগিয়ে তোলা — আমি Quality Education বলতে এটা বুঝি। এই সভায় আমি তাঁর প্রতি শ্রদ্ধা নিবেদন করলাম। একজন বাংলার শিক্ষক ছিলেন — নাম অমলেন্দুবাবু। তাঁর সে পড়ানো আমার এখনও মনে আছে। সাহিত্য পড়তে গিয়ে এখন আমি theorise করতে পারি — বিভিন্ন চরিত্রের বিশ্লেষণ করে তাদের মহিমা আমাদের প্রভাবান্বিত করেছে। আমরা একটা জিনিস শিখেছিলাম — মানবিক মূল্যবোধ। আজ আমরা বলছি — Learing to know, learning to do, learning to live together। আমরা এই সাহিত্য, কবিতা পড়তে পড়তে শিখেছিলাম learning to live others — মানুষকে ভালবাসতে শিখেছিলাম। এটাই 'Quality Education।'

কলেজ জীবনে ভাঙা চোরা স্কুল থেকে Presidency কলেজে ভর্তি হতে পেরেছি। সে এক বিরাট অনুভূতি। প্রথম ক্লাস করতে ঢুকেছি। আমার মনে আছে ইংরাজি ক্লাস। ইংরাজির অধ্যাপক ছিলেন তারাপদ মুখার্জী। প্রথম দিনই ক্লাস করে আমি বুঝতে পারলাম Presidency কলেজের উৎকর্ষ মানের কথা। এক ঘন্টা ইংরাজি ক্লাস হ'ল —

বোঝাই গেল না। আমাদের রসের সাগরে ভাসাতে ভাসাতে কল্পনার জগতে নিয়ে গিয়েছিলেন কবিতা পড়াতে পড়াতে। সারা জীবনে যতদিন বাঁচব, Quality Education- এর যত তত্ত্ব দেওয়া হোক্ না কেন — আমি বলব এটাই হচ্ছে Quality Education-এর আসল দিক্। ৫০ বছর পরেও আমার মনে আছে আমার ইংরেজি ভাষার অধ্যাপক আমাকে ইংরেজি সাহিত্য, কবিতা পড়তে উদ্বুদ্ধ করেছেন।

এই যে 'Learning to know' বলা হচ্ছে — আমাদের শিক্ষা ব্যবস্থায় তার ব্যবস্থা নেই। 'Learning to know' ভয়াবহ জায়গায় আছে। আমি পদার্থ বিজ্ঞানের ছাত্র। ছোটবেলা থেকে জেনেছি পদার্থবিদ্যা বিষয়টা বুঝতে হবে। কিন্তু আমাদের শিক্ষা ব্যবস্থায় এখন কে জানতে চায়? নোটের চাহিদা ছাত্র-ছাত্রীদের। সেই নিয়ে তারা ভাল নম্বর পায়। Newton's Laws of motion ভালভাবে বোঝাতে পারছি কিনা কেউ দেখবেনা। তাহলে Quality Education কিভাবে হবে? এই সমস্যাগুলোকে বুঝতে হবে — তবেই Quality Education- এর কথা ভাবা যাবে।

'Learning to do' — তো এখন একটা লজ্জার ব্যাপার। হাতে কলমে কাজ করা লজ্জাকর। অঙ্ক করা পাণ্ডিত্যের ব্যাপার, কিন্তু হাতে কলমে কাজ করা মানে মিস্ত্রী। Practical Class-এ Experiment করা বাদ দিয়ে আগের বছরে ছাত্রদের খাতা দেখে টোকার দিকে বেশী ঝোঁক। Work Education চালু করা হ'ল। তার শেষ পরিণতি খুবই দুঃখ জনক। কেনা জিনিস্ দিয়ে সব নম্বর পেয়ে যেত। Vocational Training- এর পরিণতিও একই রকম। কাজেই 'Learning to know, learning to do' তে কেউ interested নয়।

এবার 'Learning to live together' — এই কথায় আসছি। নিকট আত্মীয়রা বড় বড় চাকরি করে — একই শহরে থাকে কিন্তু দেখা সাক্ষাৎ নেই। Phone-এ খবর নিয়ে সম্পর্ক রাখা হয়। পাশের বাড়ীর লোককে জানছে না, আত্মীয় স্বজনকে চিনছে না — এটা learning to live together হচ্ছে? এই পরিবেশে যে বড় হচ্ছে সে Society নিয়ে ভাববে কি? যে নিজের লোক নিয়ে ভাবে না, সে পরের কথা কি ভাববে? সুতরাং বর্তমান শিক্ষা ব্যবস্থা কী ধরণের মানুষ, কী ধরণের সমাজ তৈরী করছে? এর মধ্যে থেকে কি করে Quality Education হবে?

বিজ্ঞানের ক্ষেত্রে এই একবিংশ শতাব্দী এমন কিছু বিশেষ শতাব্দী নয়। আগেই পাঁচটা দশকে বিজ্ঞানের ক্ষেত্রে বিপ্লব ঘটেছে। উনবিংশ শতাব্দী, বিংশ শতাব্দী হচ্ছে বিজ্ঞানের বিপ্লবের যুগ। কাছেই বিজ্ঞানের ক্ষেত্রে গলা কাঁপিয়ে বলার কিছু নেই। একবিংশ শতাব্দীতে বিজ্ঞানে বিপ্লব ঘটেছে। উনবিংশ শতাব্দী থেকে - প্রযুক্তি বিদ্যা Electronic Technology, Solid State Technology বিপ্লব ঘটিয়েছে। এই Technology-র প্রভাব এসে শিক্ষায় কি সাহায্য করেছে? আমরা ছোট বেলায় Radio শুনতাম। Radio টা খারাপ হলে নিজেরাই খুলে সারিয়ে নিতাম। অনেকে Radio বানাতেও পারত। কিন্তু এখন ছেলেমেয়েরা কি কখনও TV খুলে দেখবার চেষ্টা করেছে? যে সব ছেলেমেয়েরা Engineering কলেজে পড়ছে — তারা কি একবারও দেখেছে TV-র ভেতর কি আছে — বই এর পড়া ছাড়া? Technological knowledge concentrated হয় কিছু মানুষের মধ্যে। অধিকাংশ মানুষ আমরা operator and user হয়ে গেছি। ছেলেমেয়েরা TV enjoy করে — কিন্তু TV-র ভেতরে কি আছে — TV কি করে চলে — জানার

আগ্রহ নেই। একমাত্র course-এ থাকলে তবেই পড়বে। Technology develpment-এর মাধ্যমে আমরা তৈরী করছি কিছু Operator। Innovation এর কথা নেই। Engineering কলেজগুলো থেকে Graduate হবার purpose-টা হ'ল আট দশটা Company তে চাকরি নেওয়া। University গুলোর purpose হয়ে গেছে Industry তে নামকরা আট দশটা company-র লোক তৈরী করা। Physicist, Chemist, Biologist ভাল Mechanical Engineer তৈরী করা নয় — এ অবস্থায় Quality Education কী হবে? Library, Laboratory তৈরী হচ্ছে — infrastructure ভাল হয়ে উঠছে — কিন্তু Education টা কি হচ্ছে? Quality Education বলতে এখন বোঝায় ইংরাজী ভাল বলতে পারা, Subject-এ বেশী নম্বর পাওয়া আর Smartness হয়েছে কিনা, Sophisticated হয়েছে কিনা দেখা। কিন্তু শিক্ষার উদ্দেশ্য কি হওয়া উচিত — অন্যের মত মুখস্থ করা নয়, নিজের মতকে অনুসন্ধান করা। শিক্ষার উদ্দেশ্য হবে এমন মানুষ তৈরী করা যে অন্য মানুষকে পথ দেখাবে — আলোর পথযাত্রী হবে। Head and Heart এর combination হবে। মানুষের কথা ভাববে হৃদয়টাকে বিস্তৃত করবে। বিজ্ঞানের ছাত্র সাহিত্যে অনুরাগী হবে, সাহিত্য সম্পদ সম্পর্কে অবহিত হবে। মানুষকে ভালবাসবে।

Consumer Society-এর মধ্যে থেকে শুধুমাত্র TCS-এ চাকরি পাওয়া ছাত্র প্রস্তুত করা উদ্দেশ্য হবে না। ছাত্র-ছাত্রীরা শিক্ষককে খোলাখুলিভাবে তাদের মনের সব প্রশ্ন জিজ্ঞাসা করবে। Syllabus-এর বোঝা ছাত্র-ছাত্রীদের ভাববার সময় কেড়ে নিচ্ছে। তারা Creative হয়ে উঠতে পারছে না। দশটা Tutor-এর কাছে ছুটছে। এই পরিবেশে creative, innovative হবে কি করে? এটা ভাঙতে হবে। ছাত্র-ছাত্রীদের ছোটবেলা থেকে প্রশ্ন করতে শেখাতে হবে। আর ছাত্র-ছাত্রীদের Nourishment-এর কথা ভাবতে হবে — বিশেষতঃ গ্রামাঞ্চলে। কেউ খবর রাখে না কলেজে ছাত্ররা পেট ভরে খেয়ে এসেছে কিনা। আমরা জানি আমাদের অনেক report-এ উল্লেখ করা হয়েছে আমাদের Nutrition level খুবই low। Innovation এর কথা ভাবতে গেলে, পুষ্টির কথাও মাথায় রাখতে হবে। এই কাজ করতে পারবে একমাত্র শিক্ষক সমাজ। Teacher দের antonomy দরকার — তাদের শিক্ষা পদ্ধতি, কাজের ক্ষেত্রে।

ভারতবর্ষের স্বাধীনতার পর এই যে এতো development হয়েছে — এই দেশের ছেলে মেয়েরাই তো করেছে। তখন তো Quality Education- এর কথা ওঠেনি। এখন শিক্ষক নিয়োজিত হচ্ছে ভাল Result দেখে। কিন্তু শিক্ষকতা ভাল result- এর ওপর নির্ভর করেনা। শিক্ষকতা একটা বিশেষ ক্ষমতা। কিন্তু সমস্যা হ'ল বর্তমানে শিক্ষকরা by choice আসছেনা। Bank-এর চাকরি, Company-র চাকরি, School Service Commission — সব apply করছে। যেটা পাচ্ছে সেখানেই কাজ করছে। শিক্ষক বৃত্তিকে ভালবেসে আসছে না। Negative চিত্র আমি দিতে চাইছি না — বাস্তব সমস্যাগুলিকে তুলে ধরছি। তাই বলছি নতুন Teacher-দের motivate করতে হবে — Experienced Teacher-দের দিয়ে, তাদের নিয়ে বসতে হবে — তাদেরও সমস্যাগুলো জানতে হবে। আমাদের শিক্ষা ব্যবস্থার একটা ধারণা আছে বই পড়লে সব জানা যায় — এই ধারণাগুলো ভাঙতে হবে। কিভাবে পড়ালে ভাল হবে আলোচনা করা দরকার। Teacher-এর Target শুধু First bencher হবে না, পেছনের ছাত্রদেরকে নিয়েও ভাবতে হবে।

Quality Education-এর সবথেকে বড় Component হ'ল Teacher। Derozio চার বছরে যে কাজ করে গেছে — অতগুলো ছেলেদের মধ্যে আগুন জ্বালানো — সারা বছরেও কি আমরা তা করতে পেরেছি? ওটাই তো ছিল Quality Education। তারা Syllabus-এর বাইরে Society তৈরী করেছে, নবজাগরণ এনেছে দেশের ভাবনাচিন্তায়।

আজকের দিনে Computer Aided Instruction- এর কথা বলা হচ্ছে। কিন্তু Teacher এর সঙ্গে Student-এর direct instruction যা দেবে Computer -এর মাধ্যমে তা কখনও সম্ভব নয়। Computer Teacher কে supplement করতে পারবে, কিন্তু তার স্থান নিতে পারবে না। এই direct interaction- এ থাকবে motivated teacher — যাঁরা ছাত্র-ছাত্রীদের নিজস্ব সমস্যা সমাজের সমস্যা, বাড়ীর সমস্যা, জানবে — বুঝবে — সাহায্য করবে। কোথায় তাদের সমস্যা হচ্ছে — সেটা বোঝা হবে Quality Education। এই যে Creation of knowledge এর প্রতি আগ্রহ নেই, কেবলই চাকরির জন্য পড়া — to know something-এ আগ্রহ নেই — এগুলো নিয়ে teacher-দেরই ভাবতে হবে। শিক্ষার মাধ্যমে Human values জাগ্রত হচ্ছে না। সামাজিক অবমূল্যায়নের বিরুদ্ধে Teacher -রা পারেন এই Challengeটা নিতে। নিজেদের মধ্যে আলোচনা করে, Experienced Teacher-দের সঙ্গে আলোচনা করে পথ খুঁজতে হবে। সেটাই হবে Quality Education।

আজকের Society যা চাইছে, Multinational Company গুলো যেটা চাইছে, One dimensional man সেটা নয়। Multidimensional man তৈরী করতে হবে — যার মাথা, হাত, হৃদয় কাজ করে। এই ধরণের মানুষ তৈরী করতে হবে। এর practical উপায় খুঁজে বার করতে হবে। Teacher -রা পারেন এই কাজ করতে। Teacher- দেরই এই লড়াই লড়তে হবে। তবেই আমরা Quality Education- এর দিকে এগোতে পারব।

EDUCATIONAL TECHNOLOGY FOR QUALITY EDUCATION

Dr. Rita Sinha
Dept. of Education, Calcutta University

Quality is a familiar word, which originates from the Latin word qualis, which means "such as the thing really is". Total Quality Management (TQM) in education emphasises educational objective and it articulates various policies, practices and management philosophies to support that objective. Educational technology can be effectively used for qualitative development. It include (1) Input, (2) Process, (3) Output.

Educational Technology can be succesfully implemented if certain attitudes are developed among individuals such as

1) An open mind
2) Willingness to change
3) Willingness to assume
4) Willingness to learn

The most wonderful machine, the most miraculous faculty and the most complex aspect of human body is the brain. The fundamentals of brain is the network of neurons, the number of which is about 10^{11}. Neurons communicate with one another through the media synapses, usually by specific chemical transmission and also electrically by close opposition of membranes. Synapses are junctions responsible for making important decisions. Through experience only, connections among neurons take place and the synoptic networks are developed and enriched. The plasticity of brain needs lots of stimulation to build up the foundation of all learning abilities. A receptive brain is that which consists of a large number of neurons flexible enough to change their shape, and size to make more networks.

Hyden has suggested that RNA (ribonucleic acid) changes take place in the brain as a result of learning. Pribram, Newer and Barron have suggested that three dimensional photographs called 'holograms' are produced in the brain after perception, and retained in the form of memory. Eccles has proposed the hypothesis that learning produces modifications in synaptic connections, which is the structural basis of memory.

Brain interacts with the environment via sense organs. A person gains knowledge through his interaction with the environment. Piaget used the expression 'genetic epistemology' to explain his theory of development of knowledge in a person. His theory of genetic epistemology refers to incessant growth of knowledge.

Information Technology

It implies the use of technology especially electronic devices in communicating information, knowledge and skills. The various terms used in information technology are discussed as follows :

Cybernetics – Cybernetics is a science of communication and control, especially concerned with comparing human and animal brains with machines and electronic devices.

All regulatory bodies throughout our entire society are feedback control systems.

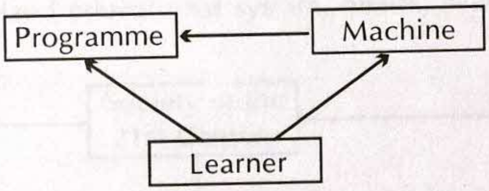
Cybernetic Model of Teaching – In cybernetic teaching model there are at least three basic elements. The input unit provides some process by which materials or information is entered into the system. The processor acts on the material or information to modify it in some way. The output unit consists of some procedure for discharging the results of the process from the system. The output from the system is returned as input to control the future output. This is called feedback.

Computer-Based Teaching Model

In this model the computer is used instead of the teacher in making decisions and providing the actual instruction.

Stolurow and Davis divide the teaching process into two phases. The pretutorial phase has a single purpose; to select for a particular student a teaching programme that will achieve particular instructional objectives. The tutorial phase has two purposes; to put the programme which has been selected into use, and to monitor the student's performance to discover whether a new programme may be more suitable than the original use.

A teaching machine is a mechanism that presents information to a student and controls his behaviour in a predetermined interacting relationship. In this way a teaching machine supplements a live teacher.



Basic Teaching Machine System

Information Processing – This approach has its origin in the science of Engineering. It conceptualizes human brain as a computer and as programmes run in high speed computer, information processing approach visualises a systematic processing of information inputs by the individuals.

Data Processors – Information processing has its own language. The data that is processed is called input and the end results are the outputs. In between, there is a series of processes or instructional manipulations of input so that output or the net result becomes effective. This can be explained by the following Fig.

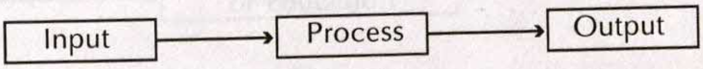


Fig.

The data has no meaning to themachine before, during or after processing. It is only the human being who transoforms the data into information. A. K. Sinha writes, "Human personality is unique. A human individual is by his very nature a steerman. In this sense he is basically different from a computing machine".

System Analysis – It is deliberately designed synthetic organisms comprised of interrelated and interacting components which are employed to function in an integrated fashion to attain pre-determined purposes.

Webster's dictionary defines a system as "a regularly interacting or independent group of items forming a unified whole". The focal theme of a system can be explained by Aristotle's statement, "The whole is more than sum of the parts". A system, therefore, may be observed as an organisation of elements or modules or subsystems which are meaningfully interrelated to achieve an overall purpose under given conditions.

System approach to teaching aims at the integration of learning and instruction coupled with direct effort to implement the emerging modern learning theory and results of research by building them into the instructional system. It is an educational tool developed to make the educational adventure more flexible, holistic, logical and orderly.

In the 20th century, the world is facing the problem of "population explosion" and "knowledge explosion", which implies that more information to be gained and more people are to be taught. There is also explosion of expectations. It is expected that educational technology will be able to solve all the problems to some extent. The computers, and robots are the greatest achievements of this century. Appearance of information and communication technology (ICT) has revolutionized educational system, health, science and engineering, as shown in Fig.

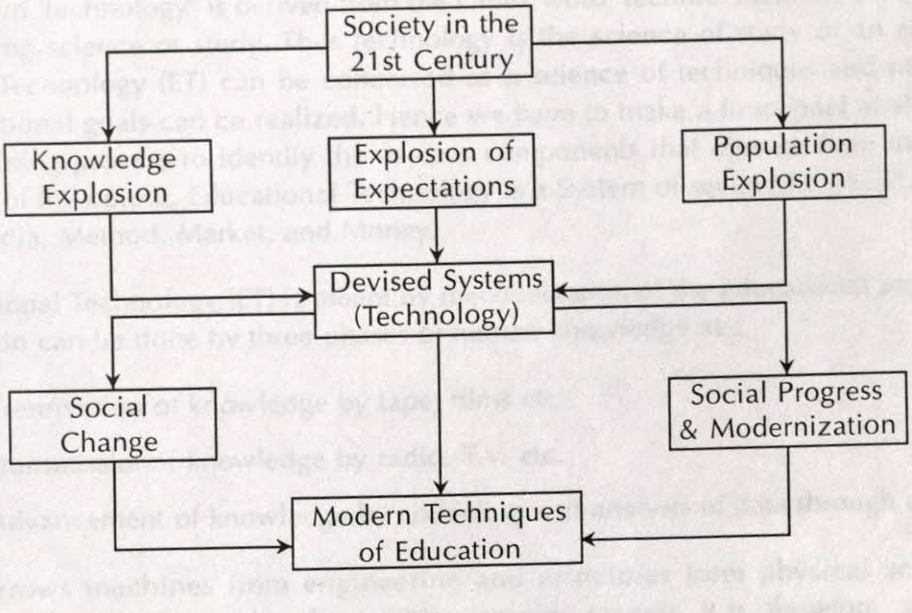

Society in the 21st Century
Knowledge Explosion
Explosion of Expectations
Population Explosion
Devised Systems (Technology)
Social Change
Social Progress & Modernization
Modern Techniques of Education

Fig.

Communicaiton and Education

Communication is a Greek word "communis', meaning 'common'. Thus a concept, fact, idea, principle, or theory is passed from one individual to other. It is a process of exchange, i.e., give and take of information by message. It is always made with some purpose. This purpose of communication is encoded in the message and transmitted to its destination where it is decoded and response (feedback) made. The four aspects of commucation are :

(i) Communicator – encoder

(ii) Message – symbols (words, pictures, signs)

(iii) Channel – media or means

(iv) Audience – decoder

A Model of commucation process developed by David K. Berlo is known as SMCR and is quite relevant to the educational system.

S	M	C	R
Source	Message	Channel	Receiver

According to Hilton, when two human beings communicate, the idea of the speaker originates in his brain (information sources), is turned into a signal by human speech organs (Transmitter) is sent by means of sound waves through air (channel) to the listener's ear (receiver), where it is reconstructed into the idea and finally reaches the listener's brain (destination).

Educational Technology

The word 'technology' is derived from the Greek word 'technic' meaning art or skill and 'logia' meaning science or study. Thus technology is the science of study of an art or skill. Educational Technology (ET) can be conceived as a science of techniques and methods by which educational goals can be realized. Hence we have to make a functional analysis of the teaching learning process to identify the various components that operate from the stage of input to that of the output. Educational Technology is a System of seven M's – Man, Machine, Material, Media, Method, Market, and Money.

Educational Technology (ET) is meant by mechanization of the educational process. This mechanization can be done by three phases of human knowledge as :

(i) Preservation of knowledge by tape, films etc.

(ii) Transmissionof knowledge by radio, T.V. etc.

(iii) Advancement of knowledge by collection and analysis of data through computers.

ET borrows machines from engineering and principles from physical science and behavioural science for improving the teaching-learning process. It is, therefore, a branch of study in which the results of engineering techniques, information science, natural science, behavioural sciences and human engineering are to be used to promote the efficiency of education. In this century, due importance is given to educational technology for human resource development.

ET has now penetrated the entire educational scenario. Concepts like programmed instruction personalised system of instruction, interaction analysis, microteaching, simulation, distance learning, system approach, multimedia approach have revolutionised teaching learning process.

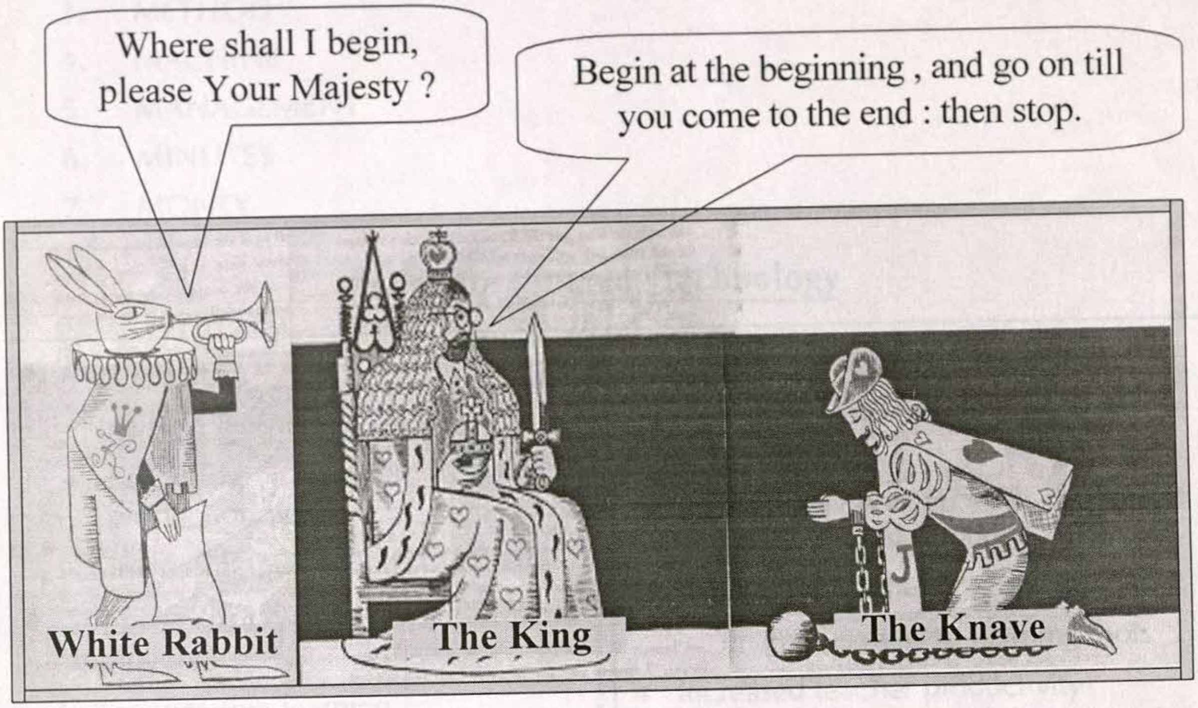
It is expected that in the 21st century, computer education will become an intergral part of education and floppies on different topics will be the storehouse of knowledge. However a machine or a programmed material can never replace a teacher. It is the teacher who conceptualises, formulates and implements the programme.

A new dimension in teaching learning process is team teaching. It is a framework in which there is integration of the subjects and the topic is perceived as a whole. As different teachers teach different aspects of the topic, it cuts across subject barriers. For example, 'Ecology' is a holistic concept which takes into account the whole of the biosphere with all its living organisms interacting withthe surrounding environment. In order to have a clear picture of this inter-disciplinary subject, an understanding of its various components is required, which can be effectively accomplished through team teaching. The phenomena of plant and animal life activities are explained through studies in Botany and Zoology and the functioning of the environment is understood through theconcepts of Geography. The basic interactions at various levels of the system as a whole are governed by the laws of Physics and Chemistry. The interrelated and interdependant components of this integrated ecosystem are modelled into Mathematical models for useful predictions. Various effects of the ecological changes on human race are visualized by studying the sociological aspects while thehazards of environmental pollution and their control measures are understood and resolved by technological advancement. Hence different teachers T_1, T_2, T_3, T_4, T_5, T_6, T_7 and T_8 can teach different aspects of ecology in which they have specialization, such as Botany, Zoology, Geography, Physics, Chemistry, Mathematics, Sociology and Technology.

The rapid expansion of scientific knowledge has revolutionized the teaching learning process and there is greater demand for better, more useful, more effective and scientific instructional techniques. Hence, the traditional techniques of teaching are being replaced by new techniques to bring modification in teaching learning process. Albert Einstein has maintained, "It is the supreme art of the teacher to awaken joy in creative expression and knowledge".

EDUCATIONAL TECHNOLOGY FOR QUALITY HIGHER EDUCATION

Prof. Asit K. Datta
Dept of Applied Physics – Calcutta University


Where shall I begin, please Your Majesty ?
Begin at the beginning , and go on till you come to the end : then stop.
White Rabbit
The King
The Knave
J

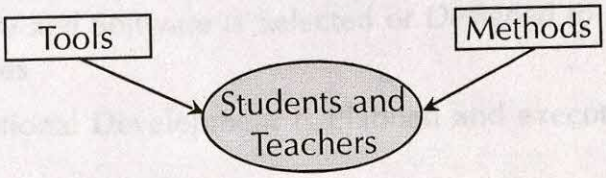
EDUCATIONAL TECHNOLOGY IS COMBINATION OF TWO WORDS - EDUCATION AND TECHNOLOGY

Definition

Educational Technology is the science of teaching using tools of technology by which educational goal could be realized.

Technology has no gender bias In fact technology is a tool for removing gender bias.

- Educational technology is a process rather than a product
- Focus is on the application of tools for educational purposes as well as the materials used
- Commonly regarded as usage of instruments, machines, computers
- In broader sense, it is a philosophy of teaching-learning process



Seven aims of Educational Technology

1. MAN
2. MATERIAL
3. METHOD
4. MACHINE
5. MANAGEMENT
6. MINUTES
7. MONEY

Rationale for using technology

- Motivation
  - gaining learner attention
  - engaging learner through production work
  - increasing perceptions of control
- Support for new instructional approaches
  - cooperative learning
  - shared intelligence
  - problem solving and higher-order skills

- Unique instructional capabilities
  - linking learners to information resources
  - helping learners to visualize problems and solutions
  - tracking learner progress
  - linking learners to learning tools
- Increased teacher productivity
- Required skills for information age
  - technology literacy
  - information literacy
  - visual literacy

Expected outcome and basic implementational issues

- Increasing the **quality** of Learning
- Increasing the **speed** of Learning
- Increasing the **capacity** of Teachers
- Reducing **costs** (without affecting quality)
- Increasing Learner **Independence**

Appropriate Hardware and Software is Selected or Designed to achieve a given set of Educational Objectives

Important that Educational Development is **Planned** and executed Systematically and Scientifically

Hardware of teaching - learning process Use of technology

I : Own experience:- Chalk, board, maps, pictures
II : Printed books:- posters
III : Slides, recording, radio
IV : Electronic media: TV, VCR
V : Computer aided instruction
VI : Instruction via World Wide Web
VIII : Virtual reality

Phases and face of technology

- The Mass Communication Phase:1946 on...
  - economics of scale, CCTV, Video, Broadcasting
- Individualized Learning 1950s onwards
  - suitably structured learning materials
- Group Learning 1960s onwards
  - stress on social interaction

The Open University is an example

- Conceived 1960s as 'University of the Air'
- First courses 1971...radio & TV broadcasts
- Software to support the individual learner
- More recent emphasis is on closer contact with tutor and other students by using computer aided instructions

Technologies to watch

1. Ubiquitous computing

- Computing anytime, anywhere
  - Handheld computers (eventually, wearable)
  - Wireless connections
  - Instant communications
  - Seamless interactivity

2. Wireless technology
3. Broadband access
4. Virtual reality (Immersive, interactive, persistence, compelling)

Computer aided instruction

What I hear, I forget
What I see, I remember
What I do, I learn

Chinese saying

- Appropriate answer matching algorithm
- Straight forward output of textural materials
- Analysis of performance
- Immediate student enquiry system

Microcomputer era

- 1950 - first computer-driven flight simulator used to train pilots at MIT
- 1959 - IBM 650 taught binary arithmetic to NY elementary school children
- 1972 to 1980 - IBM 1500 at Stanford dedicated to instruction and research on learning
- 1975 - Programmed Logic for Automatic Teaching Operations (PLATO) used to develop tutorials
- Administrative computing
- 1977 - introduction of microcomputers
- New market for educational software
- Realization that lessons on micros did not ensure quality
- Emergence of clearing houses for vetting

Computer literacy skills

- Computer literacy normally equated with programming skills and use of productivity tools
- 1985 - became regular part of curricula
- 1990s - interest shifted to technology literacy skills

Problem-solving movement

- 1980-87 - emergence of philosophy
- that the learner-directed exploration is better than teacher-directed exploration
- By 1990 – marketing of software/hardware started

Integrated learning systems

- Information superhighway for education via world wide web
- Multimedia : Provided ready access to people and information
- By 1990, Multimedia learning systems started providing instruction and practice in basic skills
- Networked microcomputers to deliver instruction and monitor and report student performance

Virtual university / virtual campus

- Distance learning solution via internet
- Web based training
- On-line video conferencing of teachers and learners
- Virtual laboratory experiments
- Virtual campus management
- Life long learning delivery and management
- Learning material development and production
- Comprehensive library
- On line assessment

Why students opt for Ed. Tech

- ☐ Career Advancement
- ☐ Requirements
- ☐ Convenience / Flexibility
- ☐ Fits schedule (Student might not want to take the class, but it fits their schedule and requirement).

Why the Universities are interested ?

- ☐ The e-learning market (includes Internet courses)
  - $ 15 billion in 2002
  - Estimated to be $25 billion in 2005
- ☐ For-profit, newly established learning centres compete against traditional educational institutions
- ☐ Forcing new marketing strategies on Universities

The Educational Technology from Philosophical Aspect.

The Education Technology is an educational philosophy for designing interactive, responsive, and valid information and learning opportunities to be delivered to learners at a time, place, and in appropriate forms convenient to the learners.

Seven Dimensions of Philosophy of Educational Technology

1. Learners
2. Learning environments
3. Professional competency
4. System capacity
5. Community connections
6. Technology capacity
7. Accountability

Learners	Use technology to deepen understanding of content and the world around them
Learning environment	Designed to achieve high academic performance by aligning standards, using researched practices, and technologies
Professional competency	Educators are fluent with technology and use it to the learning advantage of their students
System capacity	Organization is re engineered to systematically meet the needs of learners today
Community connections	Collaborative partnerships based upon commitment to a clearly defined and communicated vision
Technology capacity	Adequate technologies, resources and support to meet the system's learning goals
Accountability	Agreement on what success with technology looks like and measures in place to track and report progress

Great Expectations from the practice of Ed. Tech

- Use of technology will positively impact and foster the student's motivation to engage in learning practices that lead to new ways of thinking, understanding, constructing knowledge, communicating results, and acquiring basic skills
- The faculty and staff will be proficient, knowledgeable, and current with available technology and translate that knowledge into relevant learning opportunities for students
- Teachers will create learning opportunities and physical environments that allow students to assume more independent roles in their own learning through their use of technology.

Acc.no - 16193

Great Expectations Achievements/Improvements (for Teachers)

- Higher profile for teaching, more discussions about teaching within and across institutions
- Greater diversity of students
- From teaching methods to learning outcomes
- Greater variety of teaching/learning methods
- Growth of educational technology centers
- More teaching literature and materials in many forms
- Training for teachers : Academic Staff Colleges
- Teaching evaluated and accountable (?)
- Increased international awareness

Great Expectations Achievements/Improvements (for Students)

- Students acquire lifelong, life-wide learning skills
- Stress on learning process, not just content
- Students work independently and in teams
- Learning is task-oriented, teaching less monotonous
- Assessment closely linked to learning (emphasis on task performance, feedback and reflection)
- Students are involved in decisions about curriculum, teaching methods, and assessment
- Students have meaningful contacts with faculty

Great Expectations Achievements/Improvements (for University)

- Role of the university in the community reflected in teaching and learning
- Teaching and learning are truly the pre-eminent function of the university
- University teaching is a topic for public debate
- University Vice Chancellors see themselves as predominantly educators and speak out on teaching and learning issues

EVALUATION AND IMPACT ANALYSIS

Where are we now?

- Survival
- Visibility, recognition, influence (?)
- Organisational structures
  - national, international
- Professionalisation
  - training, standards, ethical guidelines, literature and scholarship
- Conceptual underpinnings
- Evaluating our own practice

Three questions

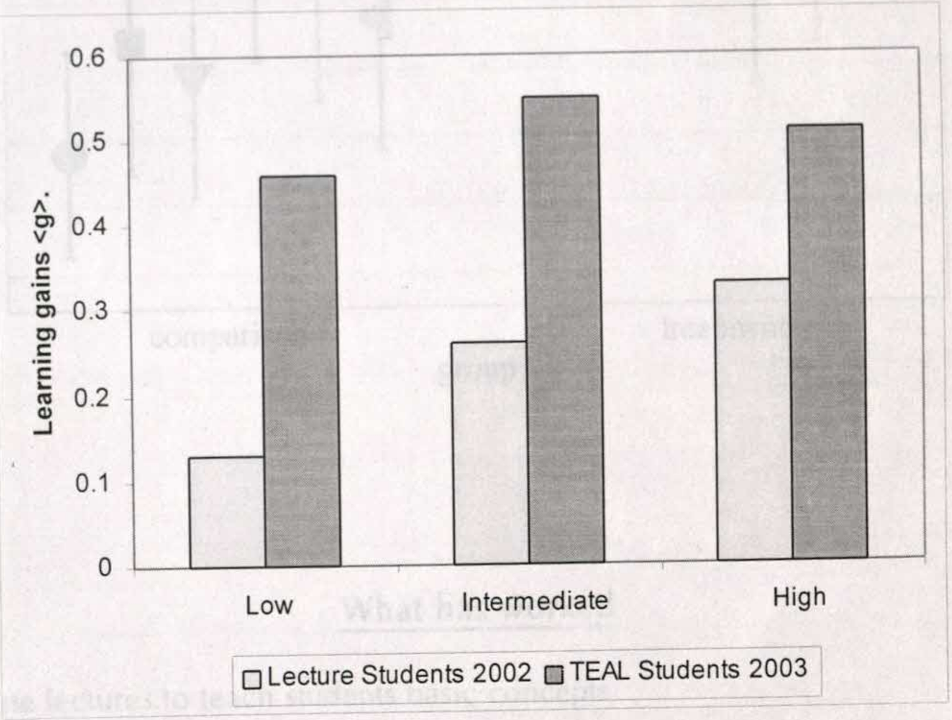
- What is the most significant achievement of educational development over the past 20 years? And what evidence can we offer to show how it took place?
- What is the biggest challenge facing educational development in the immediate and medium-term future?
- What is the biggest change we have seen in higher education in the past 20 years? (Think in particular of changes in teaching and learning process.)

Stage	Teacher behavior
Entry	Teachers learn the basics of using new technology
Adoption	Teachers use new technology to support traditional instructional methods
Adaptation	Teachers integrate new technology into traditional class room practice, focusing on increased students productivity and engagement through the use of Ed. Tech. tools
Appropriation	Teachers focus on cooperative project based interdisciplinary work which incorporate technology as needed, as one of many tools
Invention	Teachers discover new uses of technology tools often by designing projects that combine multiple technologies

Four Lessons about Educational Technology MIT experience

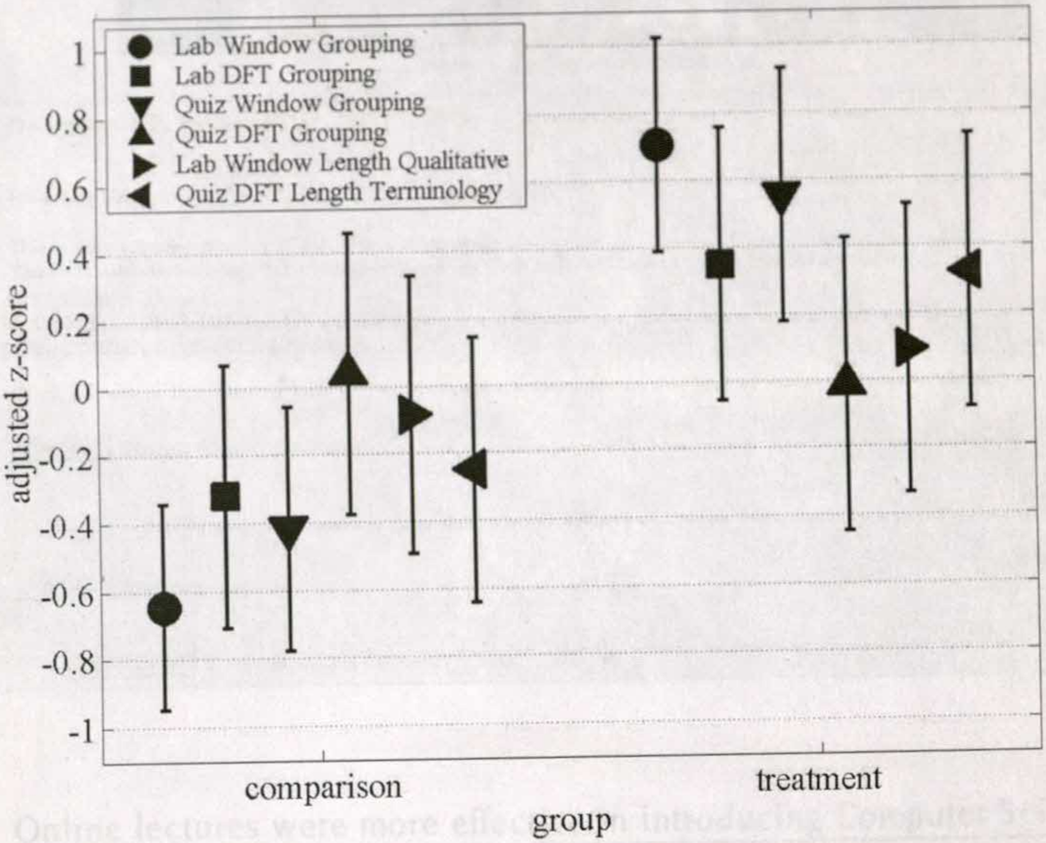
- Educational technologies have contributed to gains in learning
- Educational technologies that have met a specific educational need that has been unmet or poorly met by traditional media have been more successful
- Too much new technology, too many technologies, technologies that are poorly integrated into the curriculum have been less successful
- Studying the relationship between educational technologies and the contexts in which they are embedded has yielded important understandings

Technology-Enabled Active Learning Increased Learning Gains



$$\text{Learning gains } \langle g \rangle = \frac{\%\text{Correct}_{\text{post-test}} - \%\text{ Correct}_{\text{pre-test}}}{100\% - \%\text{Correct}_{\text{pre-test}}}$$

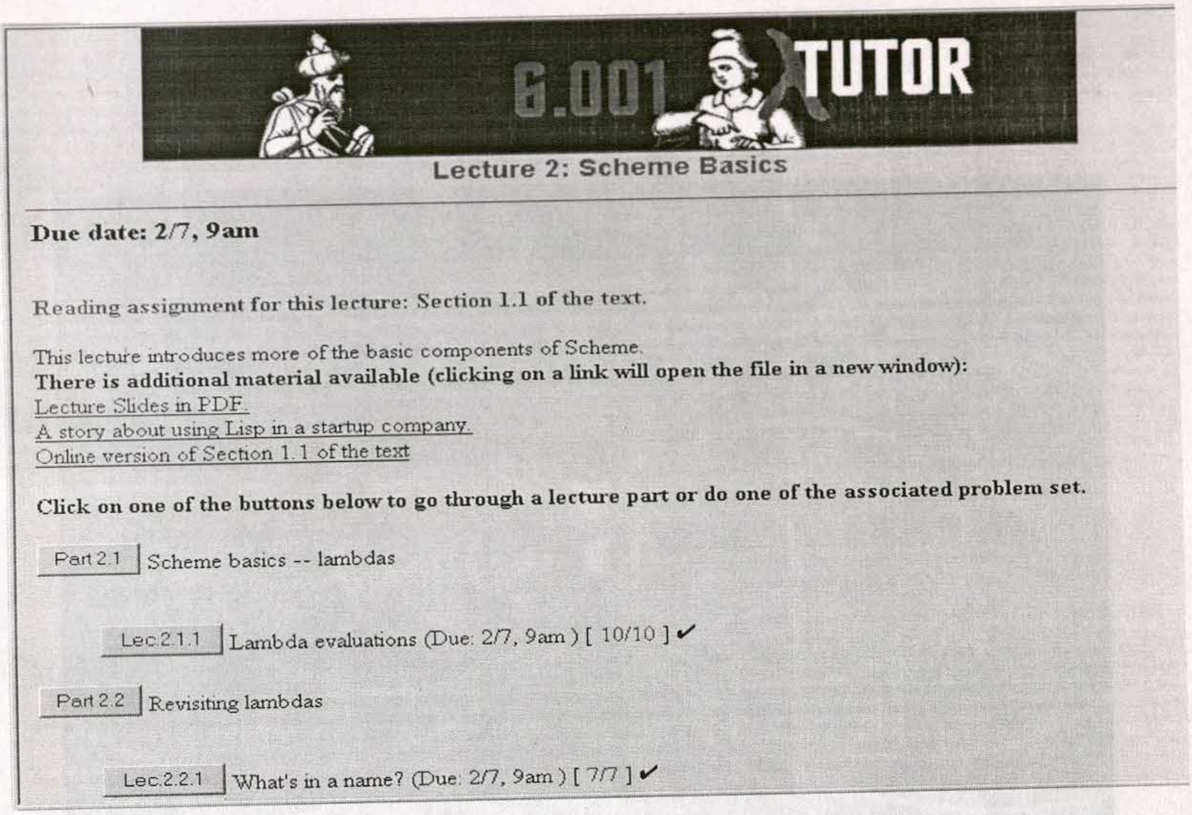
Problem-Based Module Increased Learning Gains



What has worked

- Online lectures to teach students basic concepts
- Visualizations to help students see what cannot be seen
- Archives of visual images to help students strengthen different kinds of literacy
- Wireless laptops to learn programming
- Remote online laboratories
- Technologies that provide instantaneous, more individualized feedback

Online lectures motivate students



Lecture 2: Scheme Basics

Due date: 2/7, 9am

Reading assignment for this lecture: Section 1.1 of the text.

This lecture introduces more of the basic components of Scheme.
There is additional material available (clicking on a link will open the file in a new window):
Lecture Slides in PDF.
A story about using Lisp in a startup company.
Online version of Section 1.1 of the text

Click on one of the buttons below to go through a lecture part or do one of the associated problem set.

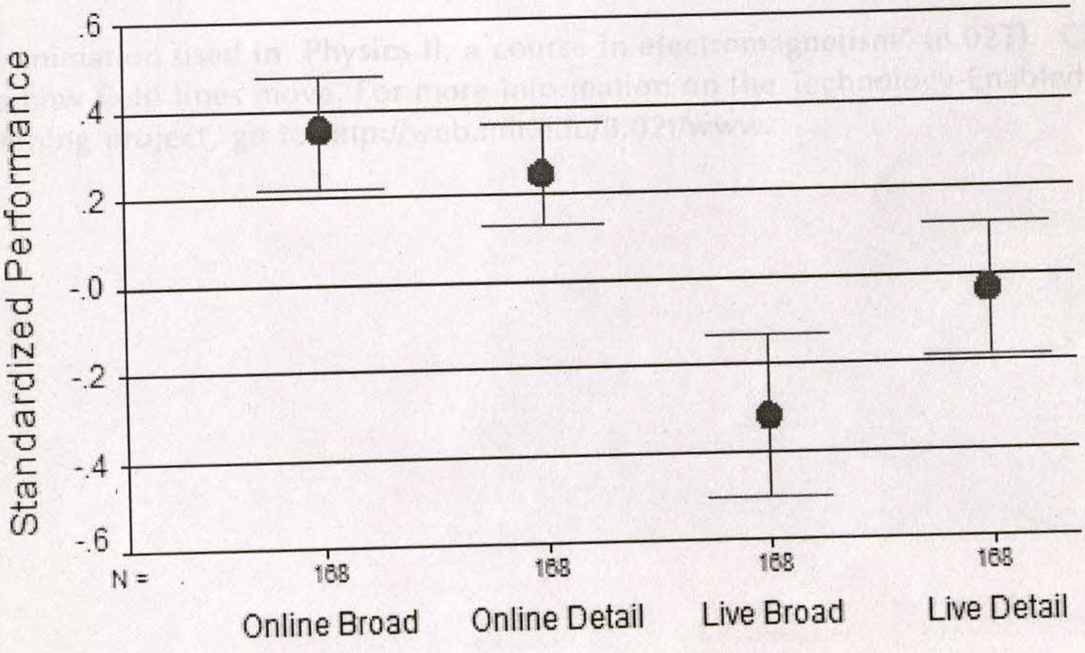
Part 2.1 Scheme basics -- lambdas

Lec.2.1.1 Lambda evaluations (Due: 2/7, 9am) [10/10] ✓

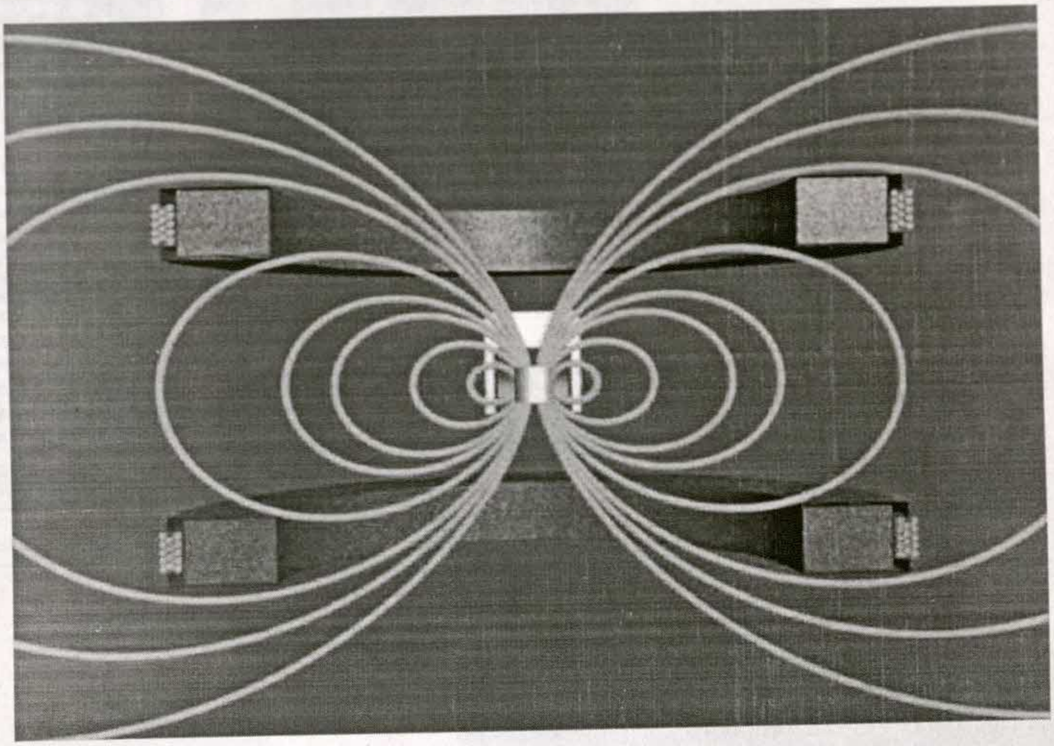
Part 2.2 Revisiting lambdas

Lec.2.2.1 What's in a name? (Due: 2/7, 9am) [7/7] ✓

Online lectures were more effective in introducing Computer Science

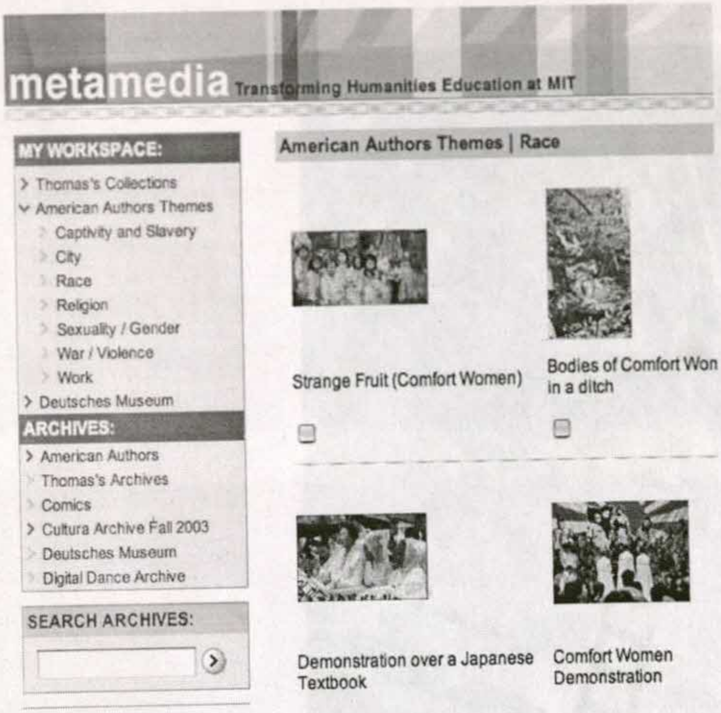


Visualizations help students see what cannot be seen



An animation used in Physics II, a course in electromagnetism" (8.02T). Click to see how field lines move. For more information on the Technology-Enabled Active Learning project, go to http://web.mit.edu/8.02t/www.

Multi Media creates visual archives that expand literacy



metamedia Transforming Humanities Education at MIT

MY WORKSPACE:

- Thomas's Collections
- American Authors Themes
  - Captivity and Slavery
  - City
  - Race
  - Religion
  - Sexuality / Gender
  - War / Violence
  - Work
- Deutsches Museum

ARCHIVES:

- American Authors
- Thomas's Archives
- Comics
- Cultura Archive Fall 2003
- Deutsches Museum
- Digital Dance Archive

SEARCH ARCHIVES:

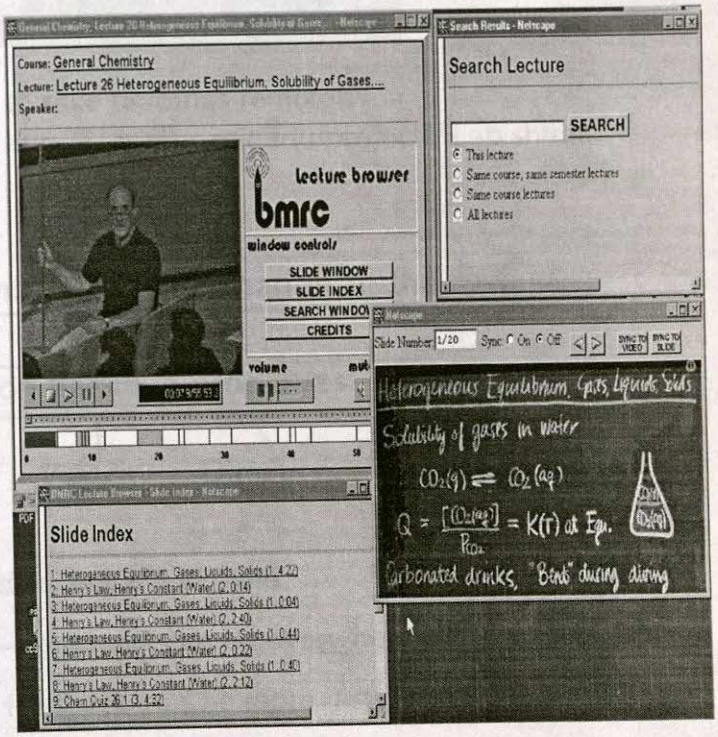
American Authors Themes | Race

Strange Fruit (Comfort Women) ☐

Bodies of Comfort Won in a ditch ☐

Demonstration over a Japanese Textbook

Comfort Women Demonstration



Course: General Chemistry

Lecture: Lecture 26 Heterogeneous Equilibrium, Solubility of Gases....

Speaker:

Search Lecture

- ● This lecture
- ○ Same course, same semester lectures
- ○ Same course lectures
- ○ All lectures

Slide Number 1/20 Sync ○ On ● Off

Heterogeneous Equilibrium, Gases, Liquids, Solids

Solubility of gases in water

$CO_2(g) \rightleftharpoons CO_2(aq)$

$Q = \frac{[CO_2(aq)]}{P_{CO_2}} = K(T)$ at Equ.

Carbonated drinks, "Bends" during diving

Slide Index

1. Heterogeneous Equilibrium, Gases, Liquids, Solids (1, 4:22)
2. Henry's Law, Henry's Constant (Water) (2, 0:14)
3. Heterogeneous Equilibrium, Gases, Liquids, Solids (1, 0:04)
4. Henry's Law, Henry's Constant (Water) (2, 2:40)
5. Heterogeneous Equilibrium, Gases, Liquids, Solids (1, 0:44)
6. Henry's Law, Henry's Constant (Water) (2, 0:22)
7. Heterogeneous Equilibrium, Gases, Liquids, Solids (1, 0:40)
8. Henry's Law, Henry's Constant (Water) (2, 2:12)
9. Chem Quiz 26.1 (3, 4:32)

MetaMedia homepage. For more information on MetaMedia, go to http://metaphor.mit.edu/.

iLab makes laboratory facilities available remotely

The Flagpole Project allows students to take readings remotely.
For more information on iLab, go to http://icampus.mit.edu/projects/iLab.shtml.

Ed Tech changes the nature of information in the system

Information has Five properties

Form Magnitude Velocity Direction Access

- ✦ If form increases ⟶ student literacy expand
- ✦ If magnitude increases ⟶ students can be overwhelmed by information
- ✦ If velocity increases ⟶ feedback can be more instantaneous
- ✦ If accessibility and direction changes ⟶ relationship between students and instructor shifts

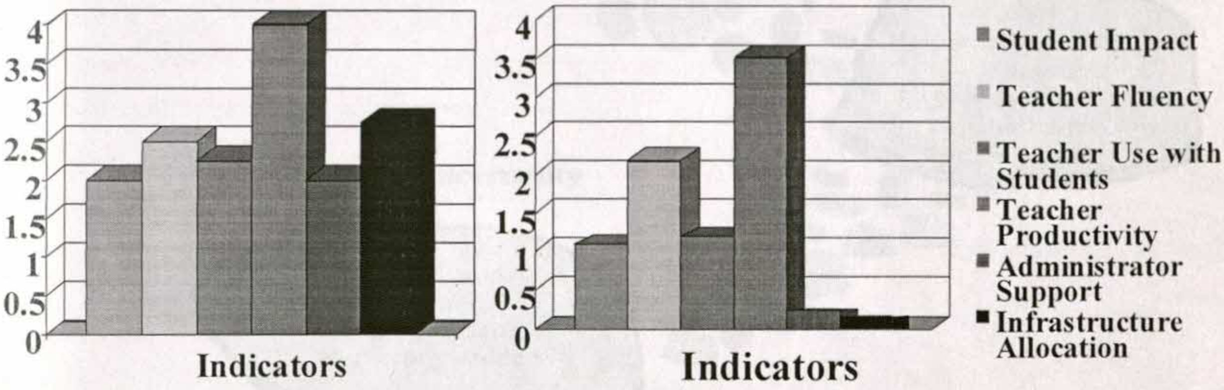
What Hasn't Worked : MIT's Experience

- ✦ Technologies designed for interaction (e.g., discussion boards) have been less successful at MIT
- ✦ When students need to learn the technology before they can learn the material, they have two things to master
- ✦ Too much technology can be detrimental
- ✦ When technology is poorly integrated into the curriculum, it is either not used at all or not used effectively by the students

- ● Scores: Even number of levels (Yes, Yes But, No But, No)

Issues

1. Student Impact 2. Teacher Fluency 3. Teacher interactions with students 4. Teachers productivity 5. Administrative support 6. Infrastructure allocations



US experience

My experience

Dismal Indian Initiatives :

Educational Technology centres are established at IITs and in some Universities. These centres are mostly engaged in preparing video lectures which are hardly used by teachers/ students

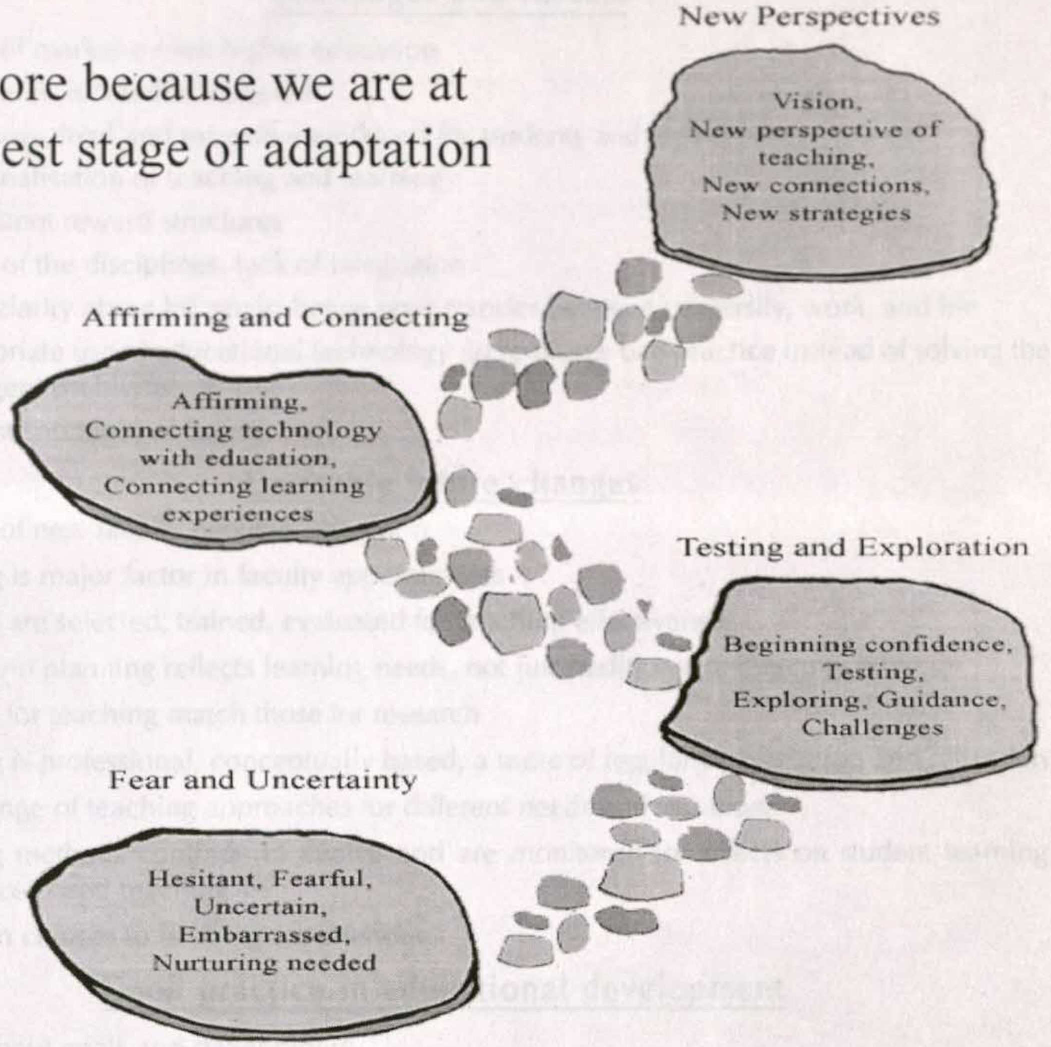
Promotion of interactive Web based tutorials at some IITs : these have good response

UGC is promoting open source, freeware E-learning platform BRISHAPATI which now includes 373 courses

None of the Universities encourage the use of Ed.Tech in class rooms, however the limited success are achieved by Open Universities.

There is hardly any web page on technical / other subjects hoisted by teachers working in Indian Universities and in institutes of higher learning (including IITs). Web pages are mainly used for posting biodata

Low score because we are at the lowest stage of adaptation



Disappointments : Our experiences

- ☆ Teaching is still largely didactic and learning is equated with formal instruction
- ☆ Assessment methods stress on low-level learning and are not aligned with goals
- ☆ Curriculum planning is not linked to learning and social needs
- ☆ Program reviews largely ignore teaching
- ☆ Student expectations are for traditional teaching
- ☆ Academic rewards do not reflect teaching achievements
- ☆ Inadequate selection, training and evaluation of teachers

Challenges and threats

- ☆ Growth of market-driven higher education
- ☆ The research is "ratchet wheeled"
- ☆ Content overload and excessive workload for students and faculty
- ☆ Depersonalisation of teaching and learning
- ☆ Non existent reward structures
- ☆ Tyranny of the disciplines, lack of integration
- ☆ Lack of clarity about HE goals; hence poor transfer between university, work, and life
- ☆ Inappropriate use of educational technology (to reinforce bad practice instead of solving the most urgent problems)
- ☆ Imminent shortages of faculty

Desirable future changes

- ✱ Training of new faculty becomes the norm
- ✱ Teaching is major factor in faculty appointments
- ✱ Teachers are selected, trained, evaluated for teaching effectiveness
- ✱ Curriculum planning reflects learning needs, not just traditional and faculty interests
- ✱ Rewards for teaching match those for research
- ✱ Teaching is professional, conceptually based, a topic of regular conversation and reflection
- ✱ Broad range of teaching approaches for different needs and situations
- ✱ Teaching methods continue to evolve and are monitored for effects on student learning ("evidence-based teaching")
- ✱ Shift from courses to learning experiences

Good practice in educational development

- ✱ Clarity about goals and stakeholders
- ✱ Conceptual basis for development approaches and activities
- ✱ Evidence-based or "scholarly"
- ✱ Emphasis on learning outcomes, not just teaching methods
- ✱ Attention to curriculum development as well as instructional methods
- ✱ Works at different levels: individual, department or faculty, and institution
- ✱ Accountable
- ✱ Politically aware
- ✱ Post graduate faculty regularly teach undergraduates
- ✱ Connections with other developers

To my mind, the only purpose of science is to lighten the toil of human existence. If scientists...confine themselves to the accumulation of knowledge for the sake of knowledge, science will be crippled.

Brecht in Galileo

- ● "The truly educated person is the one who has learned how to learn and how to change."

LIST OF PARTICIPANTS

Sl. No.	Name	Institution
1.	Dr. Partha Sarathi Roy	Ramakrishna Mission Brahmananda College of Education, Rahara.
2.	Sarbari Baksi	Institute of Edn (P.G.) for Women Chandannagar, Hooghly.
3.	Madhumala Sengupta	Dept. of Education Calcutta University.
4.	Amita Ray	Uluberia College (B.Ed. Dept.)
5.	Bharati Bhattacharya	David Hare Training College, Kolkata.
6.	Jayanti Roy	Multipurpose Govt. Girls' School, Alipore
7.	Alaka Ganguly	– Do –
8.	Reba Ganguly	– Do –
9.	Dr. (Mrs.) Bharati Banerjee	Dept. of Education, Rabindra Bharati University, Kolkata.
10.	Piu Bhattacharyya	B.Ed. Section, Uluberia College, Uluberia, Howrah.
11.	Dr. Rathindranath De	SCERT, West Bengal.
12.	Santoshi Halder	Calcutta University, Education Dept.
13.	Anita Ghoshal	Calcutta Girls' B.T. College, Kolkata
14.	Dr. Kamal Krishna De	David Hare Trg. College, Kolkata
15.	Aparna Banerjee	Institute of Education for Women, Hastings House.
16.	Krishna Gopalan	– Do –
17.	Geeta Mukerjee	– Do –
18.	Rita Sen Choudhuri	– Do –
19.	Dr. Sujata Raha	– Do –
20.	Dr. Mili Das	– Do –
21.	Dr. Priti Chowdhury	– Do –
22.	Niharika Dhal	– Do –
23.	Dr. Alpana Munshi	– Do –
24.	Aparna Roy	– Do –
25.	Shelley Dutta	– Do –
26.	Rajyasri Roy	– Do –

100 Teacher-trainees of Institute of Education for Women, Hastings House.

S. C. E. R. T. West
Library
Calcutta
25/3, B. C. Road